



#5

SEQUENCE LISTING

<110> Hammon, H. K.
Insel, P. A.
Ping, P.
Post, S. R.
Gao, M.

<120> GENE THERAPY FOR CONGESTIVE HEART
FAILURE

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<140> US 09/750,240

<141> 2000-12-26

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<151> 1999-12-27

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<151> 1998-01-16

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<151> 1997-09-05

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Glu	Leu	Gly	Leu	Arg	Ala	Val	Ala	Leu	Gly	Phe	Glu	Asp	Thr	Glu	Val
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<213> Homo sapiens

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Trp Gln Leu Asn Arg Gly Asp Ala Phe Leu Trp Lys Gln Leu Gly Ala
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Asn Val Leu Leu Phe Leu Cys Thr Asn Val Ile Ser Ile Cys Thr His
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Tyr Pro Ala Glu Val Ser Gln Arg Gln Ala Phe Gln Glu Thr Arg Ser
100 105 110
Tyr Ile Gln Ala Arg Leu His Leu Gln His Glu Asn Arg Gln Gln Glu
115 120 125
Arg Leu Leu Leu Ser Val Leu Pro Gln His Val Ala Met Glu Met Lys
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Glu Asp Ile Asn Thr Lys Lys Glu Asp Met Phe His Lys Ile Tyr Ile
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Gln Lys His Asp Asn Val Ser Ile Leu Phe Ala Asp Ile Glu Gly Phe
165 170 175
Thr Ser Leu Ala Ser Gln Cys Thr Ala Gln Glu Leu Val Met Thr Leu
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Asn Glu Leu Phe Ala Arg Phe Asp Lys Leu Ala Ala Glu Asn His Cys
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225 230 235 240
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245 250 255
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260 265 270
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275 280 285
Leu Ala Asn His Met Glu Ala Gly Ser Arg Ala Gly Arg Ile His Ile
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Thr Arg Ala Thr Leu Gln Tyr Leu Asn Gly Asp Tyr Glu Val Glu Pro
305 310 315 320
Gly Arg Gly Gly Lys Arg Asn Ala Tyr Leu Lys Glu Gln His Ile Glu
325 330 335
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Ala Ala Arg Met Leu Asn Leu Thr Pro Ala Asp Ile Thr Ala Cys His				
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Glu Leu Gly Leu Arg Ala Val Ala Leu Gly Phe Glu Asp Thr Glu Val
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Thr Thr Thr Ala Gly Gly Thr Ala Glu Val Ala Pro Asp Ala Val Pro
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Phe Gln Met Asn Gln Ser Ser Leu Thr Leu Leu Met Ala Val Leu Val
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Gln Pro Ala Tyr Val Ala Leu Leu Ala Cys Ala Ala Ala Leu Phe Val
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Thr Arg Gly Tyr Ile Gln Ala Arg Leu His Leu Gln His Glu Asn Arg
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<210> 13

<211> 1167
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Modified AC-VI

<400> 13

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			20					25					30		
Thr	Arg	Ala	Gly	Gly	Phe	Cys	Thr	Pro	Arg	Tyr	Met	Ser	Cys	Leu	Arg
		35					40					45			
Asp	Ala	Glu	Pro	Pro	Ser	Pro	Thr	Pro	Ala	Gly	Pro	Pro	Arg	Cys	Pro
	50					55					60				
Trp	Gln	Asp	Asp	Ala	Phe	Ile	Arg	Arg	Gly	Gly	Pro	Gly	Lys	Gly	Lys
65					70					75					80
Glu	Leu	Gly	Leu	Arg	Ala	Val	Ala	Leu	Gly	Phe	Glu	Asp	Thr	Glu	Val
				85					90					95	
Thr	Thr	Thr	Ala	Gly	Gly	Thr	Ala	Glu	Val	Ala	Pro	Asp	Ala	Val	Pro
			100					105					110		
Arg	Ser	Gly	Arg	Ser	Cys	Trp	Arg	Arg	Leu	Val	Gln	Val	Phe	Gln	Ser
		115					120					125			
Lys	Gln	Phe	Arg	Ser	Ala	Lys	Leu	Glu	Arg	Leu	Tyr	Gln	Arg	Tyr	Phe
	130					135					140				
Phe	Gln	Met	Asn	Gln	Ser	Ser	Leu	Thr	Leu	Leu	Met	Ala	Val	Leu	Val
145					150					155					160
Leu	Leu	Thr	Ala	Val	Leu	Leu	Ala	Phe	His	Ala	Ala	Pro	Ala	Arg	Pro
				165					170					175	
Gln	Pro	Ala	Tyr	Val	Ala	Leu	Leu	Ala	Cys	Ala	Ala	Ala	Leu	Phe	Val
			180					185					190		
Gly	Leu	Met	Val	Val	Cys	Asn	Arg	His	Ser	Phe	Arg	Gln	Asp	Ser	Met
	195						200					205			
Trp	Val	Val	Ser	Tyr	Val	Val	Leu	Gly	Ile	Leu	Ala	Ala	Val	Gln	Val
	210					215					220				
Gly	Gly	Ala	Leu	Ala	Ala	Asp	Pro	Arg	Ser	Pro	Ser	Ala	Gly	Leu	Trp
225					230					235					240
Cys	Pro	Val	Phe	Phe	Val	Tyr	Ile	Ala	Tyr	Thr	Leu	Leu	Pro	Ile	Arg
				245					250					255	
Met	Arg	Ala	Ala	Val	Leu	Ser	Gly	Leu	Gly	Leu	Ser	Thr	Leu	His	Leu
			260					265					270		
Ile	Leu	Ala	Trp	Gln	Leu	Asn	Arg	Gly	Asp	Ala	Phe	Leu	Trp	Lys	Gln
		275					280					285			
Leu	Gly	Ala	Asn	Val	Leu	Leu	Phe	Leu	Cys	Thr	Asn	Val	Ile	Gly	Ile
	290					295					300				
Cys	Thr	His	Tyr	Pro	Ala	Glu	Val	Ser	Gln	Arg	Gln	Ala	Phe	Gln	Glu
305					310					315					320
Thr	Arg	Gly	Tyr	Ile	Gln	Ala	Arg	Leu	His	Leu	Gln	His	Glu	Asn	Arg
				325					330					335	
Gln	Gln	Glu	Arg	Leu	Leu	Leu	Ser	Val	Leu	Pro	Gln	His	Val	Ala	Met
			340					345					350		
Glu	Met	Lys	Glu	Asp	Ile	Asn	Thr	Lys	Lys	Glu	Asp	Met	Met	Phe	His
		355					360					365			
Lys	Ile	Tyr	Ile	Gln	Lys	His	Asp	Asn	Val	Ser	Ile	Leu	Phe	Ala	Asp

370		375		380
Ile Glu Gly Phe Thr Ser	Leu Ala Ser Gln Cys	Thr Ala Gln Glu Leu		
385	390	395	400	
Val Met Thr Leu Asn Glu	Leu Phe Ala Arg Phe	Asp Lys Leu Ala Ala		
	405	410	415	
Glu Asn His Cys Leu Arg	Ile Lys Ile Leu Gly	Asp Cys Tyr Tyr Cys		
	420	425	430	
Val Ser Gly Leu Pro Glu	Ala Arg Ala Asp His	Ala His Cys Cys Val		
	435	440	445	
Glu Met Gly Val Asp Met	Ile Glu Ala Ile Ser	Leu Val Arg Glu Val		
	450	455	460	
Thr Gly Val Asn Val Asn	Met Arg Val Gly Ile	His Ser Gly Arg Val		
465	470	475	480	
His Cys Gly Val Leu Gly	Leu Arg Lys Trp Gln	Phe Asp Val Trp Ser		
	485	490	495	
Asn Asp Val Thr Leu Ala	Asn His Met Glu Ala	Gly Gly Gly Arg Arg		
	500	505	510	
Ile His Ile Thr Arg Ala	Thr Leu Gln Tyr Leu	Asn Gly Asp Tyr Glu		
	515	520	525	
Val Glu Pro Gly Arg Gly	Gly Glu Arg Asn Ala	Tyr Leu Lys Glu Gln		
	530	535	540	
Cys Ile Glu Thr Phe Leu	Ile Leu Gly Ala Ser	Gln Lys Arg Lys Glu		
545	550	555	560	
Glu Lys Ala Met Leu Ala	Lys Leu Gln Arg Thr	Arg Ala Asn Ser Met		
	565	570	575	
Glu Gly Leu Met Pro Arg	Trp Val Pro Asp Arg	Ala Phe Ser Arg Thr		
	580	585	590	
Lys Asp Ser Lys Ala Phe	Arg Gln Met Gly Ile	Asp Asp Ser Ser Lys		
	595	600	605	
Asp Asn Arg Gly Ala Gln	Asp Ala Leu Asn Pro	Glu Asp Glu Val Asp		
	610	615	620	
Glu Phe Leu Gly Arg Ala	Ile Asp Ala Arg Ser	Ile Asp Gln Leu Arg		
625	630	635	640	
Lys Asp His Val Arg Arg	Phe Leu Leu Thr Phe	Gln Arg Glu Asp Leu		
	645	650	655	
Glu Lys Lys Tyr Ser Arg	Lys Val Asp Pro Arg	Phe Gly Ala Tyr Val		
	660	665	670	
Ala Cys Ala Leu Leu Val	Phe Cys Phe Ile Cys	Phe Ile Gln Leu Leu		
	675	680	685	
Ile Phe Pro His Ser Thr	Leu Met Leu Gly Ile	Tyr Ala Ser Ile Phe		
	690	695	700	
Leu Leu Leu Leu Ile Thr	Val Leu Ile Cys Ala	Val Tyr Ser Cys Gly		
705	710	715	720	
Ser Leu Phe Pro Lys Ala	Leu Gln Arg Leu Ser	Arg Ser Ile Val Arg		
	725	730	735	
Ser Arg Ala His Ser Thr	Ala Val Gly Ile Phe	Ser Val Leu Leu Val		
	740	745	750	
Phe Thr Ser Ala Ile Ala	Asn Met Phe Thr Cys	Asn His Thr Pro Ile		
	755	760	765	
Arg Ser Cys Ala Ala Arg	Met Leu Asn Leu Thr	Pro Ala Asp Ile Thr		
	770	775	780	
Ala Cys His Leu Gln Gln	Leu Asn Tyr Ser Leu	Gly Leu Asp Ala Pro		
785	790	795	800	
Leu Cys Glu Gly Thr Met	Pro Thr Cys Ser Phe	Pro Glu Tyr Phe Ile		
	805	810	815	
Gly Asn Met Leu Leu Ser	Leu Leu Ala Ser Ser	Val Phe Leu His Ile		
	820	825	830	

Ser	Ser	Ile	Gly	Lys	Leu	Ala	Met	Ile	Phe	Val	Leu	Gly	Leu	Ile	Tyr
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Leu	Val	Leu	Leu	Leu	Leu	Gly	Pro	Pro	Ala	Thr	Ile	Phe	Asp	Asn	Tyr
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Asp	Leu	Leu	Leu	Gly	Val	His	Gly	Leu	Ala	Ser	Ser	Asn	Glu	Thr	Phe
865				870					875						880
Asp	Gly	Leu	Asp	Cys	Pro	Ala	Ala	Gly	Arg	Val	Ala	Leu	Lys	Tyr	Met
			885					890						895	
Thr	Pro	Val	Ile	Leu	Leu	Val	Phe	Ala	Leu	Ala	Leu	Tyr	Leu	His	Ala
		900					905						910		
Gln	Gln	Val	Glu	Ser	Thr	Ala	Arg	Leu	Asp	Phe	Leu	Trp	Lys	Leu	Gln
		915					920					925			
Ala	Thr	Gly	Glu	Lys	Glu	Glu	Met	Glu	Glu	Leu	Gln	Ala	Tyr	Asn	Arg
		930			935					940					
Arg	Leu	Leu	His	Asn	Ile	Leu	Pro	Lys	Asp	Val	Ala	Ala	His	Phe	Leu
945				950					955						960
Ala	Arg	Glu	Arg	Arg	Asn	Asp	Glu	Leu	Tyr	Tyr	Gln	Ser	Cys	Glu	Cys
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Val	Ala	Val	Met	Phe	Ala	Ser	Ile	Ala	Asn	Phe	Ser	Glu	Phe	Tyr	Val
		980					985						990		
Glu	Leu	Glu	Ala	Asn	Asn	Glu	Gly	Val	Glu	Cys	Leu	Arg	Leu	Leu	Asn
		995				1000				1005					
Glu	Ile	Ile	Ala	Asp	Phe	Asp	Glu	Ile	Ile	Ser	Glu	Glu	Arg	Phe	Arg
	1010			1015					1020						
Gln	Leu	Glu	Lys	Ile	Lys	Thr	Ile	Gly	Ser	Thr	Tyr	Met	Ala	Ala	Ser
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Gly	Leu	Asn	Ala	Ser	Thr	Tyr	Asp	Gln	Val	Gly	Arg	Ser	His	Ile	Thr
		1045						1050					1055		
Ala	Leu	Ala	Asp	Tyr	Ala	Met	Arg	Leu	Met	Glu	Gln	Met	Lys	His	Ile
		1060						1065					1070		
Asn	Glu	His	Ser	Phe	Asn	Asn	Phe	Gln	Met	Lys	Ile	Gly	Leu	Asn	Met
	1075					1080						1085			
Gly	Pro	Val	Val	Ala	Gly	Val	Ile	Gly	Ala	Arg	Lys	Pro	Gln	Tyr	Asp
	1090				1095						1100				
Ile	Trp	Gly	Asn	Thr	Val	Asn	Val	Ser	Ser	Arg	Met	Asp	Ser	Thr	Gly
1105			1110						1115						1120
Val	Pro	Asp	Arg	Ile	Gln	Val	Thr	Thr	Asp	Leu	Tyr	Gln	Val	Leu	Ala
			1125					1130						1135	
Ala	Lys	Gly	Tyr	Gln	Leu	Glu	Cys	Arg	Gly	Val	Val	Lys	Val	Lys	Gly
		1140					1145					1150			
Lys	Gly	Glu	Met	Thr	Thr	Tyr	Phe	Leu	Asn	Gly	Gly	Pro	Ser	Ser	
	1155					1160						1165			